

# VIDEO THAT'S OUT OF THIS WORLD

## A Snapshot of Video Distribution From Across the Solar System

### 1940 – 1965

- The first images from space were taken from a captured V2 rocket launched by the U.S. in 1946.
- The first 26 m antenna in what would become the DSN was built in 1958 at the Goldstone Complex in California.
- 3 DSN antennas supported the Ranger 1 launch in 1961.

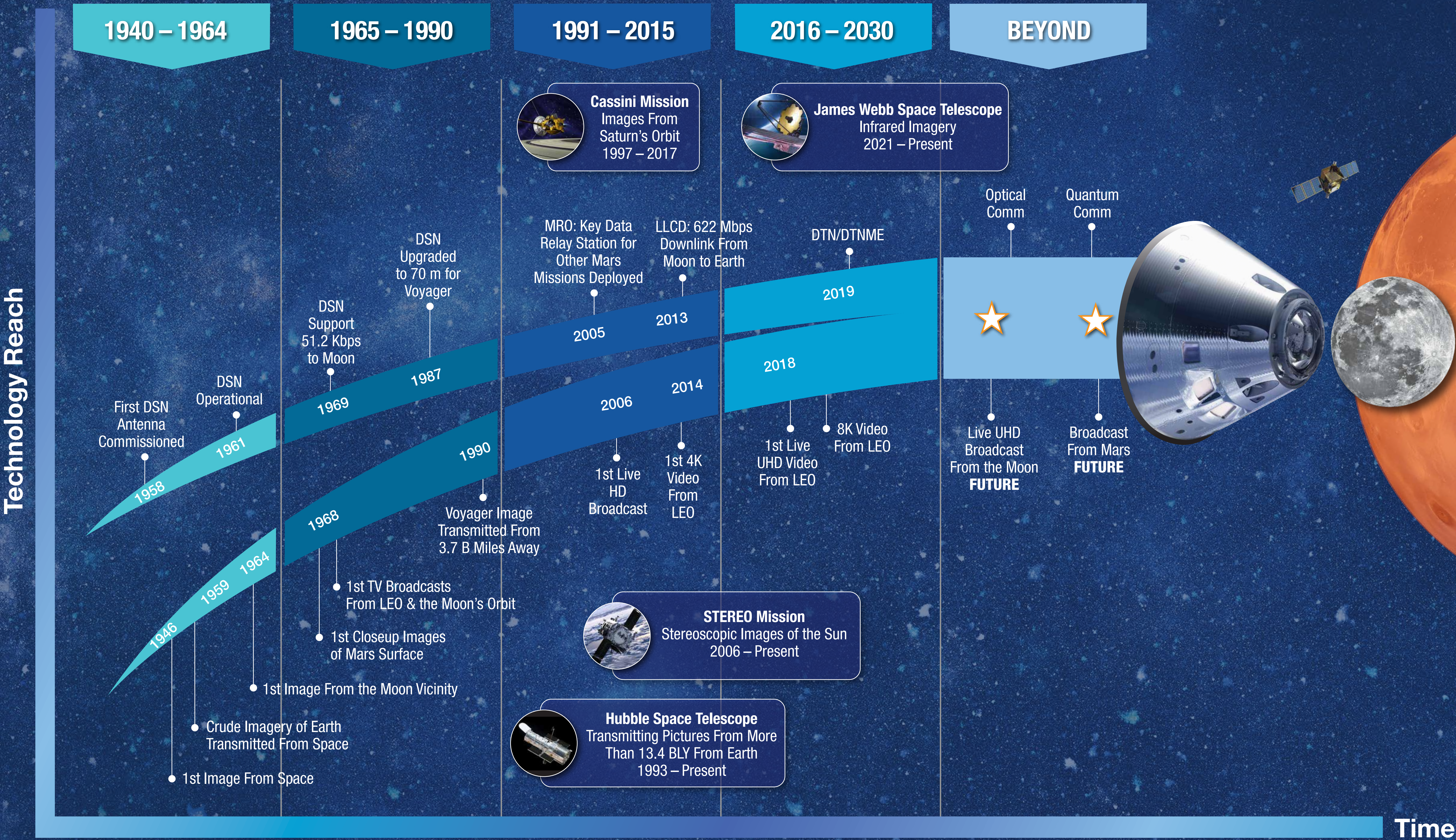
### 1966 – 1990

- In 1968 during the Apollo 7 mission, television audiences saw the first live television broadcast from space.
- Two Voyager spacecrafts flew by Mars and returned the world's first closeup imagery of the red planet.

### 1991 – 2015

- Three additional first generation TDRSs became operational between 1991 and 1995, for a total of six.
- The Hubble Space Telescope was launched into LEO in the early 90s and remains in service today.
- In 2005, the Mars Reconnaissance Orbiter (MRO) was launched.

## Space to Ground Architecture & Video Distribution Evolution



As Space to Ground Architecture Evolves, Video Distribution Across the Solar System Advances

### 2016 – 2030

- By 2017 the last of the third generation TDRSs became operational giving missions in LEO the ability to relay signals with nearly 100% coverage.
- In 2017 NASA teamed with AWS Web Services, the National Association of Broadcasters, AWS Elemental, and RED to add to NASA's exceptional history in imagery and show the world the first live digital cinema quality discussion with astronauts in space.
- As of January 2023, MSFC had introduced DTN Marshall Enterprise (DTNME), a CCSDS-compliant implementation of DTN to increase ISS DTN bandwidth from 100 to 400 Mbps.

### BEYOND

- As NASA makes plans to safely travel beyond the bounds of the Earth, back to the Moon, and ultimately to Mars, engineers and scientists are working to develop the next generation of network and communications technology.
- NASA has made the first steps into space optical communications.
- The Integrated LCRD Low-Earth Orbit User Modem and Amplifier Terminal (ILLUMA-T) will use LCRD as its relay in communications from ISS to Earth.
- NASA is also exploring space-based quantum communication demonstrations with the eventual goal of creating distributed quantum network entanglement-enabled applications.